

Old Harvard Street Bridge
National Zoological Park
Washington
District of Columbia

HAER No. DC-26

HAER
DC
WASH,
582-

PHOTOGRAPHS
WRITTEN HISTORICAL AND DESCRIPTIVE DATA
REDUCED COPIES OF MEASURED AND INTERPRETIVE DRAWINGS

Historic American Engineering Record
National Park Service
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**HISTORIC AMERICAN ENGINEERING RECORD
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Location: Old Harvard Street Bridge crosses Rock Creek just south of the new Harvard Street Bridge (1965). Formerly the connection between Harvard Street and the National Zoological Park, the bridge at present provides access from the Zoo to Beach Drive, Washington, D.C.

Date of Construction: 1900-01.

Designer and Builder: Designed by the Melan Construction Company of New York; built by the Geisel Construction Company of St. Louis, Missouri.

Present Owner: National Park Service.

Present Use: Vehicular and pedestrian bridge.

Significance: This was the largest of the several Melan-arch bridges built in Rock Creek Park in the first years of the twentieth century. Its Neoclassical detailing differentiates the Old Harvard Street Bridge from others, which were more rustic. Though considered a conservative method of concrete reinforcement by 1900, the Melan arch continued to be widely used for park bridges as it allowed designers to evoke solid masonry construction in an economical manner.

Project Information: The documentation of Rock Creek and Potomac Parkway was undertaken as a two-year pilot project to help establish standards and guidelines for recording the structures and landscape features of park roads and parkways. This project was a joint effort of the Historic American Buildings Survey and the Historic American Engineering Record (HABS/HAER), a combined division of the National Park Service, Robert Kapsch, chief. The project was sponsored by the Park Roads Program of the National Park Service, John Gingles, deputy chief, Safety Services Division. The project supervisor was Sara Amy Leach, HABS historian.

The Washington-based summer 1992 documentation team was headed by landscape architect Robert Harvey (Iowa State University-Department of Landscape Architecture) who served as field supervisor; the landscape architects were Deborah Warshaw (University of Virginia) and Dorota Pape-Siliwonczuk (US/ICOMOS-Poland, Board of Historical Palaces and Gardens Restoration); the architects were Evan Miller (University of Colorado-Boulder), Steven Nose (University of Maryland), and Tony Arcaro (Catholic University). The historians were Tim Davis (University of Texas) and Amy Ross (University of Virginia). Jack E. Boucher made the large-format photographs; Air Survey Corporation of Sterling, Virginia, produced the aerial photography and digital mapping from which the site-plan delineations were made.

History of the Crossing

The first bridge at this site was built in 1892. It was a single span, wood and iron Howe truss resting on stone abutments.¹

Melan Arches in Rock Creek Park

In 1900, Capt. Lansing H. Beach, engineer commissioner of the District of Columbia, planned to build several permanent bridges for his road through Rock Creek Park, and he obtained the services of Washington architect Glenn Brown (1854-1932). Though Brown designed three Melan-arch concrete bridges for the park, only one was built according to his design. This was Pebble Dash Bridge, completed in December 1901 (demolished in the 1960s). When built, the pebble-dash effect was not considered harmonious with park surroundings, so Brown suggested that vines be encouraged to grow over part of the facing to achieve the proper park effect.² Brown's ideas for bridges may have influenced the design of some that were built, in particular Boulder Bridge (1902, HAER No. DC-12).³

Two Melan bridges, begun in Rock Creek Park in late 1900 and completed by spring of the following year, were the first concrete and steel bridges erected in the District of Columbia. Both were built for the U.S. government, which owned and maintained Rock Creek Park. These bridges were designed by the Melan Construction Company of New York and constructed by the Geisel Construction Company of St. Louis, Missouri under the direction of Capt. Beach and Capt. H. C. Newcomer, assistant engineer. The smaller of the two--a single, five-centered arch with a span of 24' and rise of 5'--was the aforementioned Pebble Dash Bridge; it was built of Portland cement that encased nine 5" steel I-beams.

The larger Melan arch was Old Harvard Street Bridge. With a span of 80' and rise of 14', this structure was built across Rock Creek in the National Zoological Park on the former line of Quarry Road. The arch of this bridge is 18" thick at its crown and reinforced by ten steel latticed girders.⁴

In 1902, the most famous of Rock Creek Park's Melan arches, Boulder Bridge, was constructed at the site of the Old Argyle dam on the line of Beach Drive. It has a facing of fieldstones, placed to show very little of the concrete mortar at the joints. Like Pebble Dash and Old Harvard Street, this bridge, too, was designed and constructed under the direction of Capt. Beach.⁵

Background on the Melan System

Though the Melan arch, which used heavy rib reinforcing, was an effective construction method, it was considered inefficient after the turn of the century and was eventually superseded by more flexible bar reinforcing.

¹ Zack Spratt, "Rock Creek's Bridges," Records of the Columbia Historical Society 53-56 (1959): 117.

² W. J. Douglas, "Pebble Faced Bridge in the National Park, Washington, D.C.," Engineering News 49 (22 January 1903): 70.

³ William Bushong, Historic Resource Study: Rock Creek Park, District of Columbia (Washington, D.C.: National Park Service, 1990), 108.

⁴ W. J. Douglas, "Melan Arch Park Bridges at Washington, D.C.," Engineering News 46 (31 October 1901): 323.

⁵ Board of Control of Rock Creek Park, District of Columbia, Report of the Secretary, Operations from the Establishment of the Park, September 27, 1890 to June 30, 1912 (Washington, D.C.: Board of Control, 1912), 12.

In 1894 an American patent for this system of reinforcement was awarded to Austrian academic Josef Melan (1854-1941). An English translation of Melan's book, Theory of Arches and Suspension Bridges, was published in 1913.⁶ Melan postulated that wire-mesh reinforcing, as developed by Joseph Monier (1823-1906), was inadequate for concrete-arch construction. He devised a method in which parallel metal I-beams embedded in concrete ran along the lines of the arch's intrados. His design, which was basically a metal arch with a concrete covering, was used extensively in highway bridges and for some pedestrian crossings. David Plowden, author of Bridges: The Spans of North America, credits the Melan arch for "herald[ing] a new and unimaginative era of bridge design."⁷

Fritz von Emperger popularized the system in the United States. In 1897 von Emperger was awarded two patents for his additions to the Melan system: horizontal I-beams to reinforce the deck slab, and radial bars inserted into the spandrel walls and joining the arch to the deck beams.⁸ The heavy steel ribs or beams employed in this type of arch proved superfluous.

Though considered a conservative method of reinforced concrete, the Melan system, nonetheless, was relied upon by American engineers long after the turn of the century. This system was well suited to memorial-type bridge construction, which evoked stone construction with a facing of real or imitation stone.⁹

The more efficient bar-reinforcing was introduced in bridges by Ernest L. Ransome (1844-1917) in 1889, and was gaining attention in the United States by the turn of the century. This method had been used innovatively for building frames since the early 1880s. However, the design of concrete-arch bridges remained conservative in the decade from 1900-10 as the Melan system prevailed.¹⁰

Design and Description

The Old Harvard Street Bridge employs the Melan type of concrete-arch construction. Its face is smooth concrete, as is the arch ring. Molded concrete blocks provide detailing on the abutments flanking each arch. On the deck of the bridge, the approaches flair out in a curved extension of the balustrade, whose parapet is classically designed. Zack Spratt describes it as the "first bridge of a pronounced artistic design built in the District of Columbia."¹¹

⁶ David P. Billington, The Tower and the Bridge: The New Art of Structural Engineering (Princeton: Princeton University Press, 1983; reprint, 1985), 136, 142.

⁷ David Plowden, Bridges: The Spans of North America (New York and London: W. W. Norton & Company, 1974), 298.

⁸ Carl W. Condit, American Building: Materials and Techniques from the First Colonial Settlements to the Present (Chicago and London: University of Chicago Press, 1968), 174-75.

⁹ Plowden, 298-99.

¹⁰ Condit, 251.

¹¹ Zack Spratt, "Rock Creek's Bridges," Records of the Columbia Historical Society 53-56 (1959): 119.

The span of the arch is 148'; the bridge is 31' wide x 14' high. The roadway is 22' wide, the north sidewalk 2' and the south sidewalk 6'. It cost approximately \$22,000.¹²

A 1965 concrete box-girder bridge runs alongside this structure, crossing not only Rock Creek, as does the older bridge, but also spanning Beach Drive. This new Harvard Street Bridge serves to relieve the traffic burden on the historic structure.

Prepared by:
Amy Ross
HABS/HAER Historian
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¹² Spratt, 119.